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JC542 U.S. PTO

# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Atty. Docket: CRS / 227

Applicant: Steven R. Clarke

Title: HOT BITUMEN COMPATIBLE EPDM ROOFING SHEET

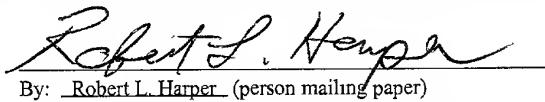
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## CERTIFICATE OF MAILING BY EXPRESS MAIL - 37 CFR 1.10

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By: Robert L. Harper (person mailing paper)

## UTILITY PATENT APPLICATION TRANSMITTAL

BOX PATENT APPLICATION  
Assistant Commissioner for Patents  
Washington, D.C. 20231

This is a request for filing, under 37 CFR § 1.53(b), a(n):

- Original (non-provisional) application.
- Divisional of prior application Serial No. \_\_\_, filed on \_\_\_.
- Continuation of prior application Serial No. \_\_\_, filed on \_\_\_.
- Continuation-in-part of prior application Serial No. \_\_\_, filed on \_\_\_.

## PRELIMINARY AMENDMENT/CALCULATION OF FEES

- Please cancel claims \_\_ without prejudice, and prior to calculating the fees. \_\_ total claim(s), of which \_\_ is(are) independent, is(are) pending after the amendment.
- Please enter the enclosed preliminary amendment identified below prior to calculating the fees. \_\_ total claim(s), of which \_\_ is(are) independent, is(are) pending after the amendment.
- The Fees are Calculated as Follows:

Fee:	Number of Claims:	In Excess of:	Extra:	At Rate:	Amount:
Total Claims	11	20	0	\$18	\$0.00
Independent Claims	2	3	0	\$78	\$0.00
MULTIPLE DEPENDENT CLAIM FEE					
BASIC FEE					\$760.00
TOTAL OF ABOVE CALCULATIONS					\$760.00
REDUCTION BY 50% FOR FILING BY SMALL ENTITY					
TOTAL					\$760.00

**ENCLOSURES**

- Utility Patent Application Transmittal Form (in duplicate) containing Certificate of Mailing By Express Mail Under 37 CFR 1.10.
- Return Postcard.

**APPLICATION PAPERS**

- Utility Patent Application, with: cover sheet, 12 page(s) specification (including 11 total claim(s), of which 2 is(are) independent), and 1 page(s) abstract.
- Drawings: 1 sheet(s) of formal drawings (1 total figure(s)).
- Microfiche Computer Program (Appendix).
- Nucleotide and/or Amino Acid Sequence, including (all are necessary): Computer Readable Copy, Paper Copy (identical to computer copy), and Statement verifying identity of copies.
- An Executed Declaration, Power of Attorney and Petition Form.
- Copy of Executed Declaration, Power of Attorney and Petition Form from prior application identified above.
- Certified Copy of priority document(s) identified as attached above.

**ADDITIONAL PAPERS**

- Assignment to Carlisle Management Company, Recordation Cover Sheet (Form PTO-1595)
- Verified Statement to Establish Small Entity Status under 37 CFR 1.9 and 1.27.
- Preliminary Amendment (to be entered prior to calculation of fees)
- Information Disclosure Statement,    sheet(s) Form PTO-1449,    U.S. Patent Reference(s),    Foreign Patent Reference(s) and    Other Reference(s)
- Other:

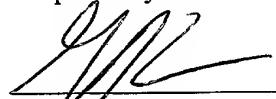
**CHECKS**

- A Check of \$760.00 for the filing fee.
- A Check of \$40.00 for the assignment recording fee.

**DEPOSIT ACCOUNT AUTHORIZATION**

- Please charge Deposit Account No. 23-3000 in the amount of   .
- The Commissioner is authorized to charge any fees under 37 CFR 1.16 and 1.17 which may be required during the entire pendency of the application, or credit any overpayment, to Deposit Account No. 23-3000. A duplicate of this transmittal is attached.
- THE PAYMENT OF FEES IS BEING DEFERRED.

Respectfully Submitted,



Gregory J. Lunn  
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Express Mail No. EL128603613US

## **APPLICATION FOR UNITED STATES PATENT**

Title: **HOT BITUMEN COMPATIBLE  
EPDM ROOFING SHEET**

Applicant: **Steven R. Clarke**

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## **SPECIFICATION**

## **HOT BITUMEN COMPATIBLE EPDM ROOFING SHEET**

### **Background**

Roof systems are made from a variety of different materials.

Historically the traditional roof system for larger buildings was formed  
5 from hot bitumen. The bitumen basically is applied to the roof deck as a molten material. A layer of roofing felt is applied over the molten bitumen. This is repeated so that there are multiple layers of bitumen and multiple layers of felt. This is commonly referred to as a built-up roof.

In the very early 1970's, single ply roofing systems were  
10 invented. These generally included a single ply of a polymeric material which was somehow fastened to a roof system. By far the most successful single ply polymeric material was ethylene propylene diene monomer rubber or EPDM. A similar material ethylene propylene monomer rubber is also employed. These systems are sensitive to some  
15 organic solvents.

Bitumens are complex mixtures of organic compounds, some of which are of such a nature as to act as a solvent or plasticizer for polymeric materials such as EPDM. Even in cases where no physical damage is evident, these materials can migrate through materials such as plasticized PVC and cause staining on the exposed surfaces.

Due to the sensitivity of these materials, they generally are not suitable for use in combination with a bituminous adhesive. Felt-backed EPDMs have been utilized and applied with a bituminous adhesive. However, in the long run they are not successful. The fleece-backed material provides a physical bonding to the bituminous adhesive overcoming the incompatibility of the EPDM to the bituminous adhesive. However, frequently the bituminous adhesive would pool up and could actually soak through the fleece-backed material, swelling and discoloring the EPDM. As a result, the fleece-backed material is now generally applied using a polymeric adhesive such as a foam polyurethane as disclosed in Venable U.S. Patent 4,996,812. One such fleece-back EPDM is disclosed in Venable U.S. Patent 5,620,554. This utilizes a polyolefin adhesive layer i.e., polyethylene to bond the fleecy material to the EPDM. Polyolefins are themselves sensitive to the same organic solvents as EPDM and therefore are unsuitable for use in contact with bituminous adhesives.

Many roofers are much more familiar with the bituminous adhesive than the polyurethane adhesive and therefore are hesitant to utilize the polyurethane adhesive. Further application of polyurethane adhesives requires an investment in equipment for efficient application.

5      Roofers who have already invested capital for equipment to apply bituminous adhesives are reluctant to invest in the newer technology.

**Summary of the Invention**

Accordingly it is the object of the present invention to provide a single ply EPDM roof membrane which can be adhered to a roof deck utilizing a bituminous adhesive.

The present invention is premised on the realization that an EPDM membrane which incorporates both a fleecy material with a protective barrier layer between the fleecy material and the EPDM can be adhered to a roof deck utilizing a bituminous adhesive. The barrier sheet in effect protects the EPDM sheeting from the bituminous adhesive and the fleece-back material provides the physical adhesion bonding the EPDM to the roof deck with the bituminous adhesive. The objects and advantages of the present invention will be further appreciated in light of the following detailed description and drawings in which:

**Brief Description of the Figure**

The figure is a cross-sectional diagrammatic view of the present invention.

**Detailed Description**

5           According to the present invention, a roof membrane 11 is bonded to a roof deck 24 by a bituminous adhesive 26. More particularly the membrane 11 includes an upper polymeric roofing layer layer 12, a barrier layer 16, and a fleece layer 22. The polymeric layer can be EPDM or thermoplastic olefin (TPO), polyvinyl chloride (PVC), chlorosulfonated polyethylene (CSPE) or ethylene propylene monomer rubber (EPM) *and alloys of these polymers.*

10           1/24/99  
The roofing layer 12 can be purchased from a variety of sources and is a well-known commodity. Any EPDM roof membrane can be utilized in the present invention. The roof membrane must be a clean sheet. In other words, all talc must be removed. A method of removing talc from EPDM is disclosed in Venable U.S. Patent 5,620,554 the disclosure of which is incorporated herein by reference. PVC and TPO sheeting is usually manufactured clean. Generally for roofing applications

15           the roofing layer 12 will be from about 40 to about 150 mills thick with 40-70 mills preferred. However, this is merely a matter of choice.

The barrier layer is a polymeric layer 16 which is either thermoset or high temperature thermoplastic and resistant to bituminous material. By high temperature it is meant that it will not melt at the application temperature of the hot asphalt which is generally about 350°

5 F. Suitable materials include generally polar polymers such as polyesters, polyurethane, polyether-urethanes and the like. Preferred materials are polyethylene terephthalate (Mylar), and polybutylene terephthalate. This layer should be as thin as possible as can be from about 0.00025 to about 0.015 inches in thickness. Although a thicker material can be utilized, it would merely add weight and provide no added benefit.

10 The barrier layer 16 is bonded to the roofing layer 12 by an adhesive layer 14. This must be an adhesive that is compatible with both the roofing layer 12 and the barrier layer. Generally a copolymer or a

15 polyurethane adhesive can be utilized for EPDM. When a hot melt is used, it can be applied as a molten liquid or as a thin sheet of adhesive which is melted during formation of the sheet 11 as described below. The adhesive may be purchased already coated on the barrier layer. One commercially available adhesive/barrier composite which is particularly

20 suitable is Trans-kote KRTY sold by Transilwrap Company, Inc.

The adhesive layer 14 is preferably the same as an adhesive layer 18 which bonds the barrier layer 16 to a fleecy material 22.

Fleecy material 22 is a fibrous material either woven or non-woven. Likewise, it should not melt at the application temperature of the  
5 hot asphalt. It can be formed from a variety of materials including polypropylene, nylon, glass, and polyester which is preferred. One such commercially available fleecy material is Trevira sold by John Manville Hoechst Celanese.

The sheeting material can be formed utilizing the equipment  
10 as disclosed in Venable U.S. Patent 5,620,554. Basically the roofing layer 12 is unwound, heated and layers of adhesive, barrier layer adhesive (optionally as an adhesive/barrier layer/adhesive composite) and fleece 22 are laid on top of each other and passed between rollers to cause the adhesive layers 14 and 18 to melt bonding the EPDM 12 to  
15 the barrier layer 16 and the barrier layer 16 to the fleece material 22.

Roof membrane 11 can also be formed by extruding hot melt adhesives between the respective layer and running the composite roofing layer barrier layer and fleece between compression rollers.

Although not shown, it may be preferable for the fleece  
20 material to have a width slightly less than the width of the roofing layer so as to provide a 2 to 4 inch selvedge edge wherein no fleece material is

present as disclosed in Venable U.S. Patent 5,620,554. This permits better adhesion for lap seams.

The roofing material 11 itself is applied to a roof deck by using bitumen i.e., asphaltic adhesive. This can be applied as a molten material. The material is heated until molten simply mopped, sprayed or poured onto the roof deck 24. The roofing material 11 is applied to the hot bituminous material prior to its solidification. Alternatively the bitumen can be supplied in a mastic form either as an emulsion or as a urethane modified asphalt which can be applied by trowel or squeegee. Adjacent sheets of roofing material can be bonded together utilizing lap seams and a separate adhesive or alternately using a lap seam tape. Any method of forming seams between adjoining sheets of roofing membrane can be employed in the present invention.

Thus the present invention combines the benefits and simplicity of an asphalt built-up roof system with the superior strength and durability of an EPDM single ply roof system. Further because the EPDM is shielded from the asphaltic material, it will not be affected by the asphaltic material.

This has been a description of the present invention along with the preferred method of practicing the present invention. However,

the invention itself should only be defined by the independent claims  
wherein I claim:

1. A roof membrane which is compatible with bituminous adhesives comprising:
  - an outer layer of a membrane selected from the group consisting of EPDM, EPM, TPO, PVC, and CSPE;
  - 5 a protecting layer bonded to a surface of said membrane wherein said protective layer is resistant to bituminous adhesives;  
said protective layer in turn bonded to a fleecy layer.

2. The roof membrane claimed in claim 1 further comprising  
a first adhesive layer bonding said membrane to said protective layer.

3. The roof membrane claimed in claim 2 further comprising  
a second adhesive layer bonding said protective layer to said fleecy layer.

5 4. The roof membrane claimed in claim 3 wherein said first and  
second adhesive layers are thermoplastic adhesive layers.

5. The roof membrane claimed in claim 1 wherein said  
protective layer is a polar polymeric material.

10 6. The roof membrane claimed in claim 1 wherein said  
protective layer is selected from the group consisting of polyester,  
polyurethane, and polyether.

7. The roof membrane claimed in claim 1 wherein said  
membrane is EPDM.

15 8. The roof membrane claimed in claim 7 wherein said fleecy  
layer is a non-woven polyester.

9. The roof membrane claimed in claim 1 wherein said membrane is a thermoplastic olefin.

10. A roof structure comprising a roof deck and a roof membrane;

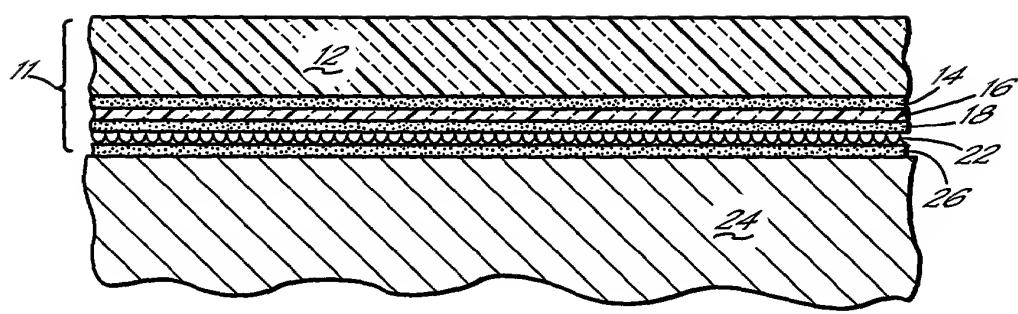
5           said roof membrane comprising an outer EPDM layer bonded to a protective layer, said protective layer comprising a polar polymer resistant to said bituminous adhesive layer;  
              a fleecy layer bonded to said protective layer wherein said fleecy layer is in turn bonded to roof deck by a bituminous adhesive layer.

11. The structure claimed in claim 10 wherein said protective layer is a polyester polymeric material and wherein said EPDM is bonded to said protective layer by a thermoplastic adhesive.

### **Abstract of the Disclosure**

A roof membrane and a roof system employing a EPDM membrane which is compatible with a bituminous adhesive. The membrane includes an outer layer of polymeric layer such as EPDM bonded to a polyester protective layer which is in turn bonded to a fleecy material. This can be adhered to a roof deck surface using hot asphalt or bitumen which bonds the fleecy material to the roof deck in turn holding the EPDM in place. The polyester layer prevents the asphaltic material from attacking and dissolving the EPDM with the fleecy material providing good adhesion between the polyester and the EPDM.

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As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

**HOT BITUMEN COMPATIBLE EPDM ROOFING SHEET**

the specification of which (check one below):

is attached hereto.

was filed on \_\_\_\_ as Application Serial No. \_\_\_\_ or Express Mail No. \_\_\_\_, and was amended on \_\_\_\_ (if applicable).

was filed on \_\_\_\_ as PCT International Application No. \_\_\_\_ , and as amended under PCT Article 19 on \_\_\_\_ (if any).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

## Prior Foreign Application(s)

## Priority Claimed?

(Number)	(Country)	Day/Month/Year Filed	( ) Yes ( ) No
(Number)	(Country)	Day/Month/Year Filed	( ) Yes ( ) No
(Number)	(Country)	Day/Month/Year Filed	( ) Yes ( ) No

I hereby claim the benefit under Title 35, United States Code, §120 and/or §119(e) of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations §1.56, which became available between the filing date of the prior application and the national or PCT international filing date of this application.

(Serial No.)	(Filing Date)	(Status: Patented, Pending, or Abandoned)
(Serial No.)	(Filing Date)	(Status: Patented, Pending, or Abandoned)
(Serial No.)	(Filing Date)	(Status: Patented, Pending, or Abandoned)

I hereby appoint John D. Poffenberger (R. No. 20,245), Bruce Tittel (R. No. 22,324), Donald F. Frei (R. No. 21,190), David J. Josephic (R. No. 22,849), A. Ralph Navaro, Jr. (R. No. 23,050), David S. Stallard (R. No. 25,930), J. Robert Chambers (R. No. 25,448), Gregory J. Lunn (R. No. 29,945), Kurt L. Grossman (R. No. 29,799), Clement H. Luken, Jr. (R. No. 32,742), Thomas J. Burger (R. No. 32,662), Gregory F. Ahrens (R. No. 32,957), Wayne L. Jacobs (R. No. 35,553), Joseph R. Jordan (R. No. 25,686), Kurt A. Summe (R. No. 36,023), Keith R. Haupt (R. No. 37,638), Kevin G. Rooney (R. No. 36,330), C. Richard Eby (R. No. 25,854), Theodore R. Remaklus (R. No. 38,754), Thomas W. Humphrey (R. No. 34,353), David E. Pritchard (R. No. 38,273), David H. Brinkman (R. No. 40,532), J. Dwight Poffenberger, Jr. (R. No. 35,324), Beverly A. Lyman (R. No. 41,961), Scott A. Stinebruner (R. No. 38,323), David E. Franklin (R. No. 39,194), Herbert C. Brinkman (R. No. 16,955), all of Wood, Herron & Evans, L.L.P., 2700 Carew Tower, 441 Vine Street, Cincinnati, OH 45202-2917, telephone no. (513) 241-2324, my attorneys,

with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith. Address all correspondence and telephone calls to

Gregory J. Lunn  
Wood, Herron & Evans, L.L.P.  
2700 Carew Tower  
441 Vine Street  
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Telephone (513) 241-2324

Wherefore I pray that Letters Patent be granted to me for the invention or discovery described and claimed in the foregoing specification and claims, and I hereby subscribe my name to the foregoing specification and claims, declaration, power of attorney, and this petition.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of Inventor Steven R. Clarke

Inventor's Signature Steven R. Clarke Date 1/22/1999

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